CLAIMS:

What is claimed is:

1. A method of providing a malignancy classification for a region of lung tissue, the method comprising:

setting time points T_1 and T_2 measured from a time point T_0 at or near an injection of a contrast agent, T_1 representing a wash-in time point for malignant lung tissue at which a first concentration value of the injected contrast agent is substantially equal to or near a peak for injected contrast agent concentration for the malignant lung tissue,

wherein at T_2 a second concentration value of the injected contrast agent for the malignant lung tissue is less than or substantially equal to the first concentration value at T_1, and a third concentration value of the injected contrast agent for non-malignant lung tissue at T_1 is less than or substantially equal to a fourth concentration value of the injected contrast agent concentration for the non-malignant lung tissue at T_2;

obtaining a first sample concentration value of the contrast agent for the region of lung tissue at T_1 and a second sample concentration value of the contrast agent for the region of lung tissue at T_2;

determining a malignancy classification for the region of lung tissue by comparing the obtained sample concentration values with a predetermined malignancy profile; and

outputting a visual representation of the malignancy classification of the region of lung tissue.

2. The method of claim 1, wherein the second concentration value is greater than the fourth concentration value.

3. The method of claim 1, wherein said determining the malignancy classification comprises judging that the region of lung tissue contains malignancy when the first obtained sample concentration value is greater than the second obtained sample concentration value.

4. The method of claim 1, wherein said determining the malignancy classification comprises judging that the region of lung tissue contains malignancy when

the first obtained sample concentration value is substantially equal to the second obtained sample concentration value, and the first obtained sample concentration value is higher than a predetermined first threshold concentration value.

5. The method of claim 1, wherein said determining the malignancy classification comprises judging that the region of lung tissue contains no malignancy when the first obtained sample concentration value is less than the second obtained sample concentration value.

6. The method of claim 1, wherein said determining the malignancy classification comprises judging that the region of lung tissue contains no malignancy when the first obtained sample concentration value is substantially equal to the second obtained sample concentration value, and the first obtained sample concentration value is less than a predetermined second threshold concentration value.

7. The method of claim 1, wherein the setting of the time points T_1 and T_2 comprises:

calculating concentration values of the injected contrast agent at initial time points T_1 and T_2;

finding a maximum intensity for a calibration map comprising a grid with axes K and v, K representing a microvascular permeability value and v representing an extracellular volume value, and obtaining normalized intensity values of each grid point of the calibration map based on the maximum intensity;

assigning one of multiple categories to each grid point based on a degree of change in concentration values between initial time point T_1 and initial time point T_2;

adjusting the calibration map such that grid points of a first category for grid points with a relatively high degree of change and grid points of a second category for grid points with a relatively low degree of change are approximately equally represented in the calibration map.

8. The method of claim 7, wherein a third category of the multiple categories is assigned to grid points with a degree of change within a predetermined range, the predetermined range being based on a noise level relative to signal strength.

9. The method of claim 8, wherein the predetermined range comprises a range of percent change substantially equal to the noise level relative to signal strength.

10. The method of claim 8, wherein the degree of change falling within the predetermined range is plus or minus 10%.

11. The method of claim 7, wherein said assigning of the one of the multiple categories comprises at least one of coloring and shading the grid point.

12. The method of claim 7, wherein T_1 and T_2 are set such that the first classification is assigned to approximately 75% of grid points representing malignant tissue.

13. The method of claim 1, wherein the concentration values of the contrast agent are measured by CT.

14. The method of claim 1, wherein the visual representation of the malignancy classification is color-coded image data.

15. The method of claim 1, wherein the visual representation is a voxel representation.

16. The method of claim 1, wherein the region of lung tissue is evaluated based on the spatial distribution of malignant tissue in the visual representation.

17. The method of claim 1, wherein registration is used to correct for shifting of the region of tissue in obtaining the concentration values.

18. The method of claim 1, wherein said outputting of the visual representation comprises smoothing based on surrounding pixels.

19. A computer-readable medium incorporating a program of instructions for providing a malignancy classification for a region of lung tissue, the program of instructions comprising:

instructions for setting time points T_1 and T_2 measured from a time point T_0 at or near an injection of a contrast agent, T_1 representing a wash-in time point for malignant lung tissue at which a first concentration value of the injected contrast agent is substantially equal to or near a peak for injected contrast agent concentration for the malignant lung tissue,

wherein at T_2 a second concentration value of the injected contrast agent for the malignant lung tissue is less than or substantially equal to the first concentration value at T_1, and a third concentration value of the injected contrast agent for non-malignant lung tissue at T_1 is less than or substantially equal to a fourth concentration value of the injected contrast agent concentration for the non-malignant lung tissue at T_2;

instructions for obtaining a first sample concentration value of the contrast agent for the region of lung tissue at T_1 and a second concentration value of the contrast agent for the region of lung tissue at T_2;

instructions for determining a malignancy classification for the region of lung tissue by comparing the obtained sample concentration values with a predetermined malignancy profile; and

instructions for outputting a visual representation of the malignancy classification of the region of lung tissue.

20. The medium of claim 19, wherein the second concentration value is greater than the fourth concentration value.

21. The medium of claim 19, wherein said instructions for determining the malignancy classification comprise instructions for judging that the region of lung tissue contains malignancy when the first obtained sample concentration value is greater than the second obtained sample concentration value.

22. The medium of claim 19, wherein said instructions for determining the malignancy classification comprise instructions for judging that the region of lung tissue contains malignancy when the first obtained sample concentration value is substantially

equal to the second obtained sample concentration value, and the first obtained sample concentration value is higher than a predetermined first threshold concentration value.

23. The medium of claim 19, wherein said instructions for determining the malignancy classification comprise instructions for judging that the region of lung tissue contains no malignancy when the first obtained sample concentration value is less than the second obtained sample concentration value.

24. The medium of claim 19, wherein said instructions for determining the malignancy classification comprise instructions for judging that the region of lung tissue contains no malignancy when the first obtained sample concentration value is substantially equal to the second obtained sample concentration value, and the first obtained sample concentration value is less than a predetermined second threshold concentration value.

25. The medium of claim 19, wherein said instructions for setting of the time points T_1 and T_2 comprises:

instructions for calculating concentration values of the injected contrast agent at initial time points T_1 and T_2;

instructions for finding a maximum intensity for a calibration map comprising a grid with axes K and v, K representing a microvascular permeability value and v representing an extracellular volume value, and obtaining normalized intensity values of each grid point of the calibration map based on the maximum intensity;

instructions for assigning one of multiple categories to each grid point based on a degree of change in concentration values between initial time point T_1 and initial time point T_2;

instructions for adjusting the calibration map such that grid points of a first category for grid points with a relatively high degree of change and grid points of a second category for grid points with a relatively low degree of change are approximately equally represented in the calibration map.

26. The medium of claim 25, wherein a third category of the multiple categories is assigned to grid points with a degree of change within a predetermined range, the predetermined range being based on a noise level relative to signal strength.

27. The medium of claim 26, wherein the predetermined range comprises a range of percent change substantially equal to the noise level relative to signal strength.

28. The medium of claim 26, wherein the degree of change falling within the predetermined range is plus or minus 10%.

29. The medium of claim 25, wherein said assigning of the one of the three categories comprises at least one of coloring and shading the grid point.

30. The medium of claim 25, wherein T_1 and T_2 are set such that the first classification is assigned to approximately 75% of grid points representing malignant tissue.

31. The medium of claim 19, wherein the concentration values of the contrast agent are measured by CT.

32. The medium of claim 19, wherein the visual representation of the malignancy classification is color-coded image data.

33. The medium of claim 19, wherein the visual representation is a voxel representation.

34. The medium of claim 19, wherein the region of lung tissue is evaluated based on the spatial distribution of malignant tissue in the visual representation.

35. The medium of claim 19, wherein registration is used to correct for shifting of the region of tissue in obtaining the concentration values.

36. The medium of claim 19, wherein said outputting of the visual representation comprises smoothing based on surrounding pixels.